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*Causes and effects of zygomatico-orbital and zygomatico-maxillo-orbital fractures managed by open reduction and rigid internal fixation**

Progressive violence, the quickening pace of life and transport facilities' development have as a consequence an increased number of traumas. Midface fractures involving zygomatic bone fractures take one of the leading positions in the total number of traumas. Literature reports many classifications of fractured zygoma. The most adequate seems to be clinico-anatomopathological nomenclature introduced by W a n y u r a . He singled out zygomatico-orbital (ZJO) and zygomatico-maxillo-orbital (ZJSO) fractures in the upper midface (9, 14). Fractures without displacement and complications can be managed conservatively. Fractured and displaced zygoma needs surgical intervention. At present, closed and open reduction are used in surgical management. The second method consists in achieving a surgical approach to the fracture's fissure, reducing the bone fragments and fixing them together by inserting abutments to the maxillary sinus, using wires or bone plates. Growing consciousness and health necessities of society set high requirements to physicians in retrieving aesthetic and functional balance of the face, disturbed by the trauma. At the same time, it seems appropriate to study the causes and effects of zygomatico-orbital and zygomatico-maxillo-orbital fractures managed by open reduction and rigid internal fixation at the present time of the medical service being reformed and economic rules being included in the treatment.

The aim of the study was: 1. to study the causes of zygomatico-orbital and zygomatico-maxillo-orbital fractures; 2. to determine the influence of social and cultural changes in injured patients' population on the fracture management; 3. to analyze the economic consequences of midface traumas.

MATERIAL AND METHODS

The material for the study consisted of 61 patients treated in 1st Department of Maxillofacial Surgery of the Silesian Medical University in Zabrze between 1996 and 2001. Zygomatico-orbital and zygomatico-maxillo-orbital fractures to be managed by open reduction and rigid internal fixations were the reasons for their admission.

Hospital and outpatient histories were studied retrospectively. General patient's data (age, sex) and trauma causes were taken into consideration. Clinical symptoms confirmed during admission

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were collected. The number of utilized bone plates (internal fixations) and the total time of hospitalization were settled. All the collected data were scheduled and studied furthermore towards statistical significance. A confidence level p lower than 0.05 was taken. The following statistical tests were used: chi-square test supplemented by Yates' amendment if necessary, analysis of regressive linear correlation by Pearson, t-Student's test.

RESULTS

The study involved 61 patients (4 women and 57 men aged from 14 to 68) with the average age of 34.5 years (Fig. 1 and Fig. 2). Predominant trauma causes were assaults and traffic accidents (Fig. 3) which was in connection with the growth of violence and the pace of life in recent times. A statistically significant dependence between trauma cause and the patients' age (p=0.003) and sex (p=0.011) was noticed. Assaults were the commonest in patients aged 21–30 years, but accidents at work were predominant in patients aged 31–40 years as well as traffic accidents (Fig. 4). Assaults, falls and accidents at work were the trauma causes only in men, but traffic accidents concerned both men and women (Fig. 5). A nearly statistically significant dependence between the trauma cause and selected clinical symptoms, i.e.: face asymmetry (p=0.114), double vision (p=0.099) and limited mouth opening (p=0.130) was noticed. Face asymmetry was more common among assaulted patients. Double vision

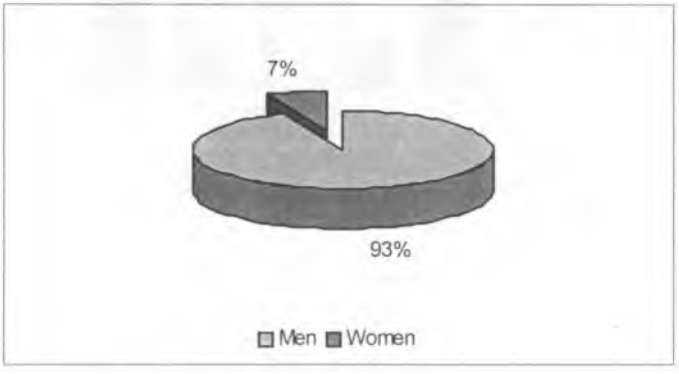

Fig. 1. Patients' sex

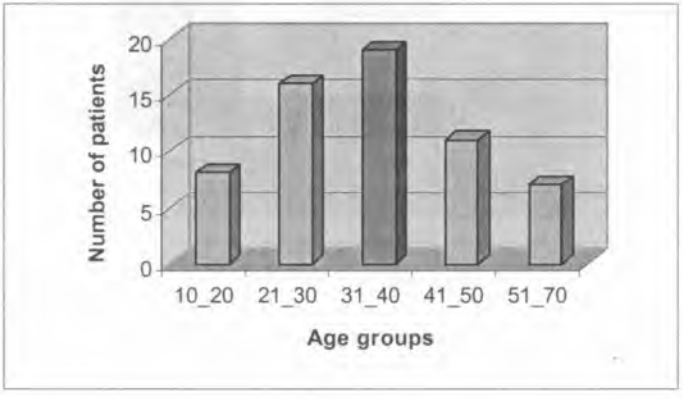

Fig. 2. Patients' age

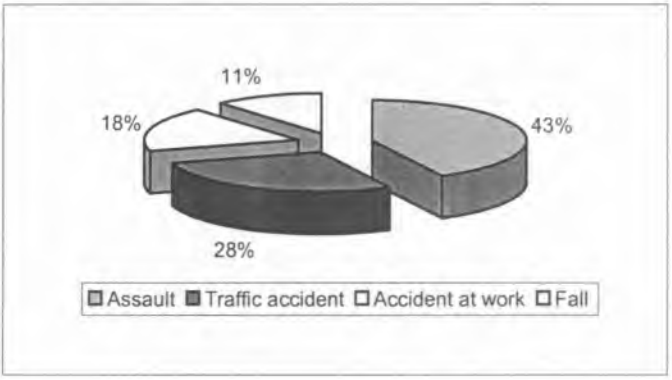

Fig. 3. Trauma cause

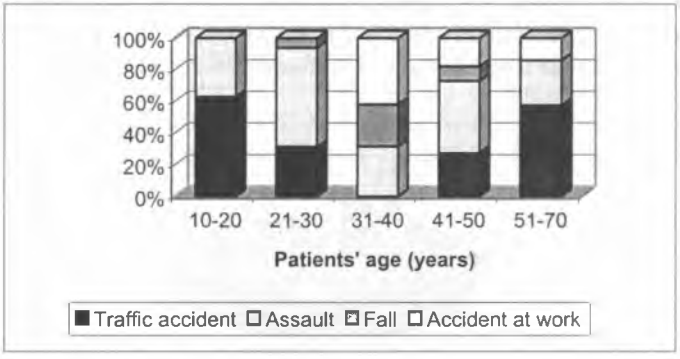

Fig. 4. A statistical dependence between trauma cause and patients' age, p=0.003 (chi-square Pearson's test)

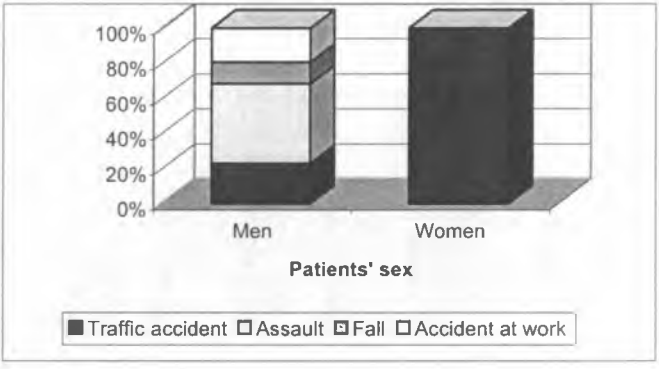

Fig. 5. A statistical dependence between trauma cause and patients' sex, p=0.011 (chi-square Pearson's test)

was usually the effect of a traffic accident or an accident at work but limited mouth opening was equally observed among victims of assault or those injured in traffic accidents (Fig. 6, Fig. 7 and Fig. 8).

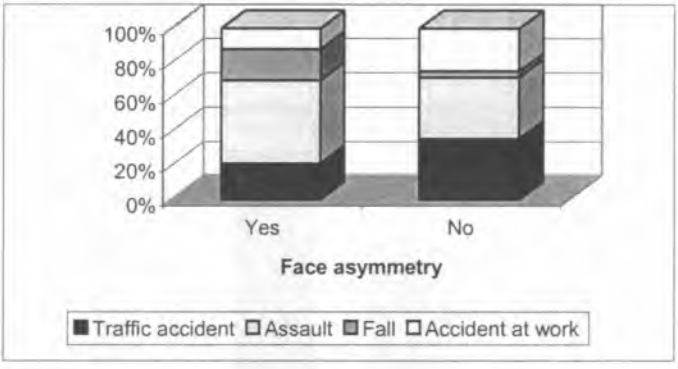

Fig. 6. A statistical dependence between the fracture's symptom (flattening of osseous structures expressed by face asymmetry) and trauma cause, p=0.114 (chi-square Pearson's test)

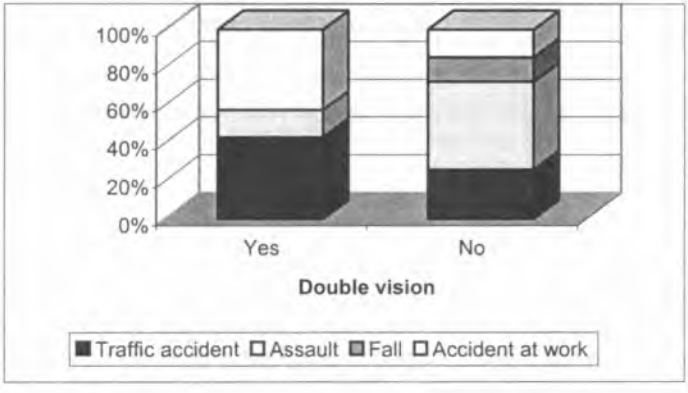

Fig. 7. A statistical dependence between the fracture's symptom (double vision) and trauma cause, p=0.125 (chi-square Pearson's test)

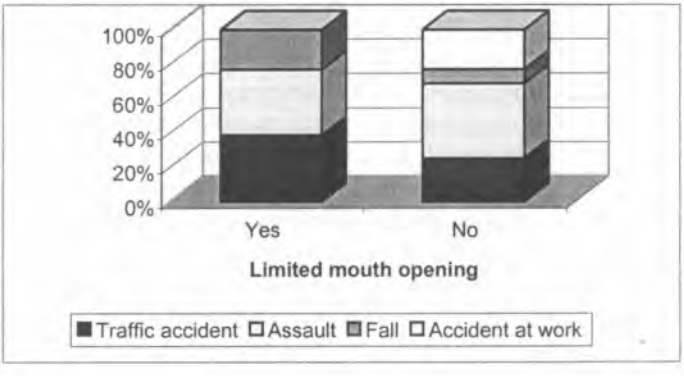

Fig. 8. A statistical dependence between the fracture's symptom (limited mouth opening) and trauma cause, p=0.130 (chi-square Pearson's test)

The above-mentioned traumas necessitated a multiple application of internal fixations which raised the costs of treatment considerably. The number of bone plates (internal fixations) utilized in the zygomatic region had a significant influence on the total time of hospitalization. The group of patients with one fixation (bone plate) compared to the group with two fixations and the group with one fixation compared to the group with three fixations showed a statistically significant prolongation of average hospitalization time (for one plate utilized it reached an average 17.9 days, for two plates – 22.0 days and for three plates – 23.0 days) (Fig. 9) and further growth of treatment costs.

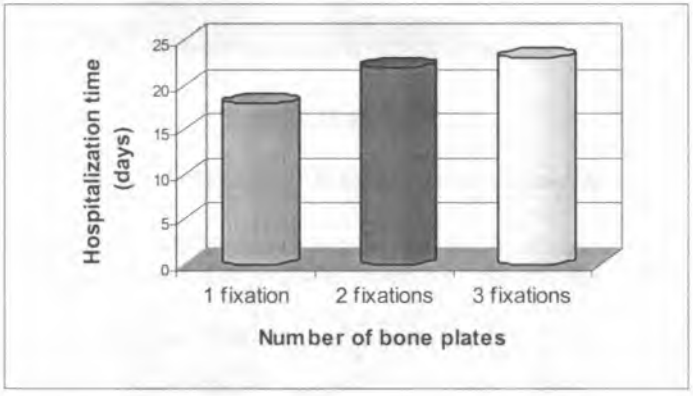

Fig. 9. Number of bone plates utilized in the zygomatic region versus hospitalization time: 1 vs. 2 – p=0.003; 1 vs. 3 – p=0.031 (t-Student's test)

DISCUSSION

There were 93% of men and only 7% of women in the presented study (it is a ratio of 14,25 to 1). In the literature, the ratio fluctuates from 2.86 to 8.31 to 1 (1, 2, 3, 4, 5, 8, 10, 11, 12, 15). It is more common for men to get injury to the zygomatic region. However, the described predominance is much higher in the study than that reported in the literature which may be related to the recent growth of violence, especially in the male population. The statistical dependence between trauma cause and patient's sex (p=0.011) seems to confirm this. Assaults, falls and accidents at work were the trauma causes in the male group exclusively. The average patients' age was 34.5 years which is similar to other authors (reported from 26 to 37,5 years) (1, 2, 4, 12, 13, 15). The group of patients aged from 31 to 40 years was the most numerous. The literature reports similar data according to the age of patients being injured (2, 5, 6, 7, 10, 15). The age structure of the presented material is similar to those reported in literature. The traumas of zygoma usually concern young people at the top of their social and professional career. Statistical dependence between the trauma cause and the patient's age (p=0.003) seems to confirm this. Accidents at work, falls, and assaults were the most common in the group aged from 21 to 40 years. The predominant trauma causes in the study were assaults – 43%, but traffic accidents with 28% took second place. The analysis of own material and the data presented in literature show significant similarities in the etiology of midface traumas (4, 7, 8, 10, 11, 12). Changes in the etiology of zygoma's fractures have not been observed throughout recent years. The dependence between the trauma cause and selected clinical symptoms of the fracture (i.e.: flattening of osseous structures expressed by face asymmetry, double vision and limited mouth opening) has been noticed. The flattening of zygoma was mainly the effect of assault (p=0.114). Double vision was equally the result of traffic accident and accident at work (p=0.099) but limited mouth opening was equally the result of traffic accident and assault (p=0.130). Those symptoms which are susceptible to appear after high energy

action and the statistical dependencies show a very high assault and traffic accident incidence of traumas. Devastations caused by injuries induce physicians to use the effective but expensive operating techniques. A statistically significant prolongation of total hospitalization time arises from the own study's dependence between the number of bone plates utilized in the zygomatic region and the average hospitalization time. Comminuted, considerably displaced and high energy fractures demand more fixations (bone plates) which prolongs the interruption in the social and professional activity of injured patients.

The described, up-to date methods of treatment are classified to be highly specialistic medical procedures. Unfortunately, they are followed by high costs of hospitalization, surgical procedures and patients' rehabilitation demanding an attentive engagement of insurance companies.

CONCLUSIONS

1. Assaults and traffic accidents are the most frequent and devastating causes of zygomatico-orbital and zygomatico-maxillo-orbital fractures. The fractures usually involve men aged from 21 to 40 years.

2. The rapid growth of violence and the pace of life have in recent times necessitated the general use of advanced and expensive operating techniques in injured patients.

3. The break in social and professional activity of injured patients and the scale of the problem indicate the necessity of change in medical service financing.

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SUMMARY

Progressive violence, the quickening pace of life and transport facilities' development have as a consequence an increased number of traumas. Midface fractures involving zygomatic bone fractures take one of the leading positions in the total number of traumas. It seems appropriate to study the causes and the effects of zygomatico-orbital and zygomatico-maxillo-orbital fractures managed by open reduction and rigid internal fixation at the present time of the medical service being reformed and economic rules being included in the treatment. The analysis of the economic consequences of midface traumas and their causes as well as the search for the influence of social and cultural changes on fracture management was the aim of the study. Histories of 61 injured patients treated by open reduction and rigid internal fixation in 1st Department of Maxillofacial Surgery of the Silesian Medical University in Zabrze between 1996 and 2001 were studied. Patients' sex, the most frequent trauma causes and their disposition in different age groups were taken into consideration. It was observed that certain symptoms of the fracture tend to coexist with high energy traumas (traffic accidents, violent assaults). The influence of injury's extension on the prolongation of hospitalization time was emphasized. It was concluded that assaults and traffic accidents are the most frequent and devastating causes of zygomatico--orbital and zygomatico-maxillo-orbital fractures. The fractures usually involve men aged from 21 to 40 years. The rapid growth of violence and the pace of life have in recent times necessitated the general use of advanced and expensive operating techniques in injured patients recently. The break in social and professional activity of injured individuals and the scale of the problem indicate the necessity of change in medical service financing.

Przyczyny i następstwa złamań jarzmowo-oczodołowych i jarzmowo-szczękowo-oczodołowych leczonych metodą repozycji otwartej i bezpośredniej osteosyntezy płytkowej

Postępująca brutalizacja, rosnące tempo życia i rozwój środków transportu przynoszą w skutku zwiększenie ilości urazów. Złamania środkowego piętra czaszki twarzowej, w tym kości jarzmowej, zajmują jedną z czołowych pozycji. W dobie reform sektora usług medycznych oraz włączenia zasad ekonomii w proces leczenia celowa wydaje się analiza przyczyn i następstw złamań jarzmowo--oczodołowych i jarzmowo-szczękowo-oczodołowych leczonych metodą repozycji otwartej i bezpośredniej osteosyntezy płytkowej. Celem pracy była analiza przyczyn złamań, ustalenie wpływu zmian społecznych i kulturowych zachodzących w populacji poszkodowanych pacjentów na stosowane leczenie oraz analiza ekonomicznych konsekwencji urazów w obrębie środkowego piętra czaszki twarzowej. Analizie poddano dokumentację medyczną 61 pacjentów leczonych z powodu złamań jarzmowo-oczodołowych i jarzmowo-szczękowo-oczodołowych metodą repozycji otwartej i osteosyntezy płytkowej w I Katedrze i Klinice Chirurgii Szczękowo-Twarzowej Śląskiej Akademii

Medycznej w Zabrzu w latach 1996–2001. Ustalono najczęstsze przyczyny złamań, uwzględniono wpływ płci pacjentów i rozkład przyczyn urazów w poszczególnych grupach wiekowych. Zaobserwowano tendencje do występowania wybranych objawów złamania okolicy jarzmowej w związku z urazami o wysokiej energii (wypadki komunikacyjne, brutalne pobicia). Wykazano wpływ rozległości uszkodzenia na wydłużenie czasu hospitalizacji pacjentów. Ustalono, że najczęstszymi i najbardziej traumatycznymi przyczynami złamań jarzmowo-oczodołowych i jarzmowo-szczękowo-oczodołowych są pobicia i wypadki komunikacyjne. Złamania dotyczą głównie mężczyzn w wieku 21–40 lat. Gwałtowny wzrost agresji społecznej i tempa życia w ostatnich latach wymusza powszechne stosowanie zaawansowanych i kosztownych technik zabiegowych u poszkodowanych pacjentów. Przerwa w aktywności społecznej i zawodowej poszkodowanych pacjentów oraz skala zjawiska wskazują na konieczność modyfikacji systemu finansowania świadczeń.